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Knowledge, attitude and practice of ergonomics among dental students: A cross-sectional pilot study

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Abstract
Background: Ergonomics in dentistry aims to minimize strain, prevent work-related illnesses, and enhance productivity. Despite its integration into dental education, research reveals persistent musculoskeletal risks among dentists due to their seated position, hand posture, and procedural duration. The study aims to assess the awareness of ergonomics and its application among dental students in their clinical practice.
Method: A self-structured questionnaire comprising 15 questions pertaining to knowledge, attitude and practice was formulated and distributed among dental students in a private dental college, Chennai, India. A total of 83 responses were obtained and descriptive statistics were used to analyze the data.
Result: Out of the total 83 participants, 29 (34.9%) reported experiencing musculoskeletal pain, with neck and back region being the most prevalent. A majority 39 (47.0%) demonstrated awareness of the term "ergonomics" in the context of dental practices. About 19 participants (22.9%) implement ergonomics in their routine dental practice.
Conclusion: Understanding and implementing ergonomics can mitigate musculoskeletal risks, enhance productivity, and elevate the overall quality of dental care. The study recognizes the pivotal importance of knowledge regarding ergonomics and proposes its integration in dental practice and curriculum.

Keywords: Musculoskeletal disorder, awareness, dental professionals

Introduction
The Greek language, "Ergo" signifies "work," while "Nomos" refers to "natural laws" or "systems. Ergonomics is the study of work including the tasks, the technology, and the environment, about human capabilities which leads to improved productivity, reduced injuries, and greater worker satisfaction [1]. Ergonomics has been an integral part of dental education at the University of British Columbia since the early 1980s. Nonetheless, research consistently highlights the ongoing risk of musculoskeletal issues among dentists [2]. Dentists are susceptible to developing musculoskeletal disorders (MSD) due to the nature of their seated position, hand posture, and the extended duration of their procedures [3]. An improper posture can result in muscle necrosis, pain, and protective muscle contractions that immobilize or "splint" the affected area, thereby promoting the onset of a Musculoskeletal Disorder (MSD) [4]. Ergonomics in dentistry aims to minimize cognitive and physical strain, prevent work-related illnesses, and enhance productivity while ensuring greater comfort for both dental professionals and patients [5]. Dental practitioners often experience work-related musculoskeletal disorders (WMSD) when working in confined spaces that necessitate maintaining static or uncomfortable positions, exerting excessive force, and precise hand and wrist movements [6]. Typical instances of workplace risk factors encompass occupations involving repetitive, forceful, or extended use of the hands; frequent or strenuous lifting, pushing, pulling, or carrying of substantial objects; and prolonged uncomfortable positions. The degree of risk is contingent upon the intensity, frequency, and duration of exposure to these circumstances [7]. The Ergonomic Standard, as stipulated by the Occupational Safety and Health Administration (OSHA), advocates that the most efficient and effective approach for addressing "ergonomic hazards" leading to musculoskeletal strain is through implementing engineering enhancements in the workstation [8].

The objective of this study is to evaluate the understanding of ergonomics, along with the knowledge, attitudes, and practices related to it among dental students. Additionally, it aims to analyze their awareness and comprehension of Musculoskeletal Disorders (MSD).

Methods

A cross sectional survey was conducted among undergraduates and postgraduate students of a private dental college in Chennai, India. The study was approved by the ethics committee board of Dr. MGR Educational and Research Institute, Chennai, India. A self-structured questionnaire was generated in google forms comprising 15 questions and circulated via social media. The questions analyzed the knowledge, attitude and practices of ergonomics among the study population and probed into the participants' endeavors to improve their posture, scheduling of appointments in their routine practice with an understanding of Musculoskeletal Disorders (MSD) in the dental field. A final count of 83 responses were recorded and included in the study. To analyze the data SPSS (IBM SPSS Statistics for Windows, Version 23.0, Armonk, NY: IBM Corp. Released 2015) was used to calculate frequency and percentage of the variables.

Results

Out of 83 participants, 9 (10.8%) were third year students, 15 (18.1%) were fourth year students, 52 (62.7%) were interns and 7 (8.4%) were Postgraduate students. In the present study, a significant proportion experienced musculoskeletal discomfort, with 29 (34.9%) students reporting discomfort in the head and neck region, 11(13.3%) in the upper extremities, and 6 (7.2%) in the lower extremities, whereas 10 (12%) reported no discomfort.

The predominant physical activity among the students was brisk walking, with 18 (21.7%) students followed by 14 (16.9%) who practiced yoga, 6 (7.2%) cycling, 5 (6.0%) swimming, 3 (3.6%) jogging and Zumba dancing. Around 10 (12.0%) participants played outdoor sports and 23 (27.7%) engaged in regular workouts. Regarding exercise habits, 10 (12.0%) exercised daily while 34 (41.0%) exercised once a week followed by 14 (16.9%) students who exercised five days a week, 16 (19.3%) once a month and 16 (10.8%) who abstained from any physical activities.

In terms of knowledge, the term ergonomics was correctly defined by 39 (47.0%) participants out of which 26 (31.3%) believed it could reduce work-related injuries and 15 (15.7%) recognized its potential to reduce fatigue, increase accuracy, and improve productivity. About 46 (55.4%) students considered ergonomics to bring about efficient dental practice.

In terms of practicing ergonomics in the dental field, 19 (22.9%) students implemented ergonomics in their daily clinical practice with 27 (32.5%) being most of the times, 29(34.9%) occasionally and 2 (2.4%) completely ignored applying ergonomics in their daily practice.

Stretching movements between appointments were followed by 17 (20.5%) with 22 (26.5%) occasionally, 14 (16.9%) rarely, and 7(8.4%) not at all. The recommended finger grip position while holding instruments was followed by 30 (36.1%) of the students, whereas only 1 (1.2%) did not.

Table 1: Demographic details of the study participants

Questions	Options	Frequency	Percent
Gender	Male	24	28.9
	Female	59	71.1
Year of study	3rd year	9	10.8
	4th year	15	18.1
	Intern	52	62.7
	Pg	7	8.4
Do you experience pain or discomfort in the musculoskeletal structures currently or in the past, if so which region?	Head and neck	29	34.9
	Upper extremities	11	13.3
	Lower extremities	6	7.2
	None	10	12.0
How frequently do you exercise or engage in physical activities?	Daily	10	12.0
	5 days a week	14	16.9
	Once a week	34	41.0
	Once a month	16	19.3
	Never	9	10.8
Type of physical activity you frequently exercise (multiple options can be selected)	Yoga	14	16.9
	Cycling	6	7.2
	Swimming	5	6.0
	Jogging	3	3.6
	Brisk Walking	18	21.7
	Zumba dancing	3	3.6
	playing outdoor sports	10	12.0
	Regular work out	23	27.7

Table 2: Knowledge of dental students regarding ergonomics.

Questions	Options	Frequency	Percent
What is Ergonomics?	An applied science concerned with the ethical use of Dental equipment	11	13.3
	An applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely	39	47.0
	study of the proper application of dental medicine	4	4.8
	The study of the applied science involving the selection dental chair and dental stool for dental practitioners	29	34.9

According to you, what are the benefits of applying Ergonomics in the dental field?	Reduction of work-related injuries	26	31.3
	Reduction of work-related injuries, Higher productivity	4	4.8
	Reduction of work-related injuries, Higher productivity, Increased accuracy	1	1.2
	Reduction of work-related injuries, Higher productivity, Reduced fatigue	2	2.4
	Reduction of work-related injuries, Higher productivity, Reduced fatigue, Increased accuracy	13	15.7
	Higher productivity	9	10.8
	Higher productivity, Increased accuracy	1	1.2
	Higher productivity, Reduced fatigue	1	1.2
	Higher productivity, Reduced fatigue, Increased accuracy	1	1.2
	Reduced fatigue	11	13.3
	Reduced fatigue, Increased accuracy	1	1.2
What are the risks of not implementing Ergonomics in our practice?	Poor posture	24	28.9
	Poor posture, Contact stress	12	14.5
	Poor posture, Increased work	3	3.6
	Poor posture, Increased work, Contact stress	8	9.6
	Poor posture, Increased work, Contact stress, Higher safety	3	3.6
	Poor posture, Increased work, Higher safety	2	2.4
	Increased work	16	19.3
	Increased work, Contact stress	2	2.4
	Contact stress	9	10.8
	Higher safety	4	4.8
What is MSD, in relation to ergonomics?	Mitral septal defects	6	7.2
	Musculoskeletal defects	21	25.3
	Musculoskeletal disorders	53	63.9
	Major systematic disorders	3	3.6

Table 3: Attitude of dental students regarding ergonomics.

Questions	Options	Frequency	Percent
Do you think ergonomics will bring about efficient dental practice?	Yes	46	55.4
	Maybe	36	43.4
	No	1	1.2
How often do you make an effort to correct your posture?	Always	9	10.8
	Most of the time	44	53.0
	Occasionally	27	32.5
	Rarely	2	2.4
	Never	1	1.2
Do you schedule your appointments such that there is break time in between cases?	Yes	15	18.1
	Most of the times	22	26.5
	Occasionally	33	39.8
	Rarely	10	12.0
	No	3	3.6
Do you think the principles of Ergonomics should be taught in class and exclusively included in the dental curriculum?	Yes	45	54.2
	May be	34	41.0
	No	4	4.8
Do you think Dental chairs and Dental instruments contribute to Ergonomics?	Yes	44	53.0
	Maybe	35	42.2
	No	4	4.8

Table 4: Practice of ergonomics amongst dental students.

Questions	Options	Frequency	Percent
Do you implement Ergonomics in your daily practice?	Yes	19	22.9
	Most times	27	32.5
	Occasionally	29	34.9
	Rarely	6	7.2
	No	2	2.4
Do you orient your position in accordance to the quadrant you are working on?	Yes	22	26.5
	Most times	39	47.0
	Occasionally	17	20.5
	Rarely	3	3.6
	No	2	2.4
Do you tend to do change from sitting to standing position in between appointments?	Yes	19	22.9
	Most times	15	18.1
	Occasionally	28	33.7
	Rarely	16	19.3
	No	5	6.0

Do you tend to do stretching movements in between appointments?	Yes	17	20.5
	Most of the time	23	27.7
	Occasionally	22	26.5
	Rarely	14	16.9
	No	7	8.4
Do you follow the finger grip position while holding the instruments?	Yes	30	36.1
	Most of the time	25	30.1
	Occasionally	19	22.9
	Rarely	8	9.6
	No	1	1.2
Does the condition of your workplace follow the standards of Ergonomics?	Yes	18	21.7
	Most of the time	23	27.7
	Occasionally	27	32.5
	Rarely	11	13.3
	No	4	4.8
Do you manage to maintain back rest on the dental stool you use while treating patients?	Yes	21	25.3
	Most times	26	31.3
	Occasionally	25	30.1
	Rarely	9	10.8
	No	2	2.4

Discussion

Dental professionals commonly prioritize their patients' well-being, sometimes overlooking their working posture until they encounter pain or discomfort. This lack of attention to ergonomics renders dentistry a profession with a heightened risk of Musculoskeletal Disorders (MSD), with many practitioners frequently noticing pain in different regions throughout their careers. The study acknowledges the prevalence of musculoskeletal discomfort and varying exercise habits among dental professionals.

In the present study, majority of the participants 29 (34.9%) reported discomfort in the head and neck region with a few in the lower extremities. A significant proportion 34 (41.0%) reported exercising once a week. These findings are in contrast to a study conducted by Harish C Jadhav *et al.* [9] in Maharashtra, India wherein the majority reported pain only in the back region and engaged in routine physical exercises for 15 mins.

In regards to the frequency of engagement in physical activities and exercise, around 34 (41%) participants in the current study reported to exercise once a week. These findings aligned with a study by Rubina Mumtaz *et al.* [10] in Islamabad.

The present study reveals that in terms of knowledge, 39 (47%) participants correctly identified the definition of ergonomics. This finding was distinguished by a study in Saudi Arabia [8] where a majority of study participants, 99 (70%) indicated a lack of literature knowledge regarding ergonomics. This portrays varying levels of concepts and understanding regarding ergonomics among participants across different nations.

The present study shares common findings with that of Harish C Jadhav *et al.* [9] with ergonomics being considered by dental students as a significant factor in mitigating various health issues. Both the studies recognize that despite the participants' awareness of ergonomics and musculoskeletal disorders (MSDs), there is a tendency to unintentionally compromise on their posture in a constrained working environment, leading to adverse health effects. The recommendation for timely workshops and increased awareness aligns in both discussions, emphasizing the importance of education and proactive measures to address ergonomic concerns in dental practice.

In the present study, 19 (22.9%) implement ergonomics in their daily with maximum students implementing it occasionally 29 (34.9%) in their clinical practice whereas in the Islamabad study [10], a significant number of dental residents 43 (64.3%) rarely maintain ergonomically neutral position in their dental practice.

In the present study, when questioned about stretching movements between appointments, 17 (20.5%) respond affirmatively, while 22 (26.5%) occasionally and 14 (16.9%) rarely. In the study conducted by Rubina Mumtaz *et al.*, 31.5% of participants reported doing chairside stretches rarely, surpassing the 16.9% in our study who stretch rarely between appointments.

Conclusion

Understanding and implementing ergonomics can lead to a reduction in work-related injuries, increased productivity, and improved overall quality of dental care. There is a recognition of the benefits of ergonomics among participants in the present study and the need to encourage consistent implementation of ergonomic practices routinely. These findings suggest further research and interventions aimed at enhancing ergonomics awareness and practices in the dental field, ultimately benefiting both dental professionals and their patients.

Conflict of Interest

Not available

Financial Support

Not available

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